Montana Department of Transportation

Materials Sampling, Field Testing and Laboratory Testing Plan

Strategic Highway Research Program

SPS-8 Experimental Project

Federal Aid Project No. RS 273-1(2)0

State Highway No. RS 273

Deerlodge County

Montana

Prepared By

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REVISED APRIL 1994

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Materials Sampling, Field Testing and Laboratory Testing Plan SPS-8 Experimental Project RS 273 Project, Deerlodge County, Montana

This document presents a materials and sampling plan for the experimental Strategic Highway Research Program (SHRP) SPS-8 project planned for construction on the RS 273 project, RS 273-1(2)0, east of Anaconda in north Deer Lodge County, Montana. The experimental test sections will be constructed in the north bound direction on the RS 273 main lanes.

Background

The LTPP SPS-8 experiment entitled, "Strategic Pavement Studies of Environmental Effects In the Absence of Heavy Loads", consists of the construction of 2 test sections with asphalt concrete (AC) surface layers and base layers of varying thickness.

In the next portion of this document, tables of materials sampling, field tests and laboratory test quantities are presented. This is followed by a detailed presentation of the materials sampling, field testing, and laboratory testing plan and requirements of the Montana SPS-8 project.

Sampling and Testing Quantities

The estimated quantities for materials sampling, field testing, and laboratory testing for the SPS-8 experimental project are contained in Tables 1 and 2. It should be noted that the SHRP sampling and test procedures referenced in these tables and in other portions of this document must be followed in conducting this work. This includes completion and submission of all required data forms.

Table 1. Estimated quantities of laboratory materials testing for the SPS-8 experimental project, RS 273 Montana.

	SHRP TEST Designation	SHRP Protocol	No.
SUBGRADE			
Sieve Analysis	SS01	Ship to FHWA lab	3
Hydrometer to 0.01 mm	SS02	Ship to FHWA lab	3
Atterberg Limits	SS03	Ship to FHWA lab	3
Classification and Type of Subgrade	SS04	P52	3
Moisture-Density Relations	SS05	Ship to FHWA lab	3
Resilient Modulus	SS07	Ship to FHWA lab	3
Unit Weight	SS08	P56	2
Natural Moisture Content	SS09	Ship to FHWA lab	3
Unconfined Compressive Strength	SS10	P54	2
Permeability	SS11	P57	1
In-Place Density		SHRP-LTPP Method	9
Expansion Index	SS12	P60	20
DENSE GRADED AGGREGATE BASE			
Particle Size Analysis	UG01	Ship to FHWA lab	3
Sieve Analysis (washed)	UG02	Ship to FHWA lab	3
Atterberg Limits	UG04	Ship to FHWA lab	3
Moisture-Density Relations	UG05	Ship to FHWA lab	3
Resilient Modulus	UG07	Ship to FHWA Lab	3
Classification	UG08	Ship to FHWA lab	3
Permeability	UG09	P48	3
Natural Moisture Content	UG10	Ship to FHWA lab	3
In-Place Density		SHRP-LTPP Method	9
ASPHALT CONCRETE SURFACE			
Core Examination/Thickness	AC01	P01	3
Bulk Specific Gravity	AC02	P02	3
Maximum Specific Gravity	AC03	P03	3
Asphalt Content (Extraction)	AC04	P04	3
Moisture Susceptibility	AC05	P05	3
Creep compliance	AC06	Ship to FHWA Lab	1
Resilient Modulus	AC07	Ship to FHWA Lab	3
Indirect Tensile Strength	AC07	Ship to FHWA Lab	3
In-Place Density		SHRP-LTPP Method	6

Table 1. Estimated quantities of laboratory materials testing for the SPS-8 experimental project, RS 273 Montana (Contd.).

	SHRP TEST Designation	SHRP Protocol	No.
Extracted Aggregate			
Specific Gravity of Coarse Aggregate	AG01	P11	3
Specific Gravity of Fine Aggregate	AG02	P12	3
Type and Classification of Coarse Aggregate	AG03	P13	3
Type and Classification of Fine Aggregate	AG03	P13	3
Aggregate Gradation	AG04	P14	3
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	3
NAA Test for Coarse Aggregate Particle Shape	AG06	P14B	3
Asphalt Cement			
Abson Recover	AE01	P21	3
Penetration @ 50F, 77F, 90F	AE02	P22	3
Specific Gravity @ 60F	AE03	P23	3
Viscosity @ 77F	AE04	P24	3
Viscosity @ 140F, 275F	AE05	P25	3
Asphalt Cement (from plant)			
Penetration @ 50F, 77F, 90F	AE02	P22	3
Specific Gravity @ 60F	AE03	P23	3
Viscosity @ 77F	AE04	P24	3
Viscosity @ 140F, 275F	AE05	P25	3

Table 2. Estimated quantities for material sampling and other field tests on SPS-8 project, RS 273 Montana.

	Quantity	Units
Asphalt Concrete		
Coring (4" diameter cores)	16	Cores
Bulk Sampling Mix (200 lbs samples)	3	Samples
Bulk Sampling Asphalt Cement (5 gallon pails)	3	Samples
Bulk Sampling Mix for MRL (200 lbs sample)	1	Sample
Bulk Sampling Asphalt Cement for MRL (15 gallons)	1	Sample
Bulk Sampling Aggregate for MRL (500 lbs sample)	1	Sample
Aggregate Base		
Bulk Sampling (400 lbs samples)	3	Samples
Moisture Content Samples	3	Jars
Subgrade		
Thin-walled tube sampling	12*	Samples
(* 2 tubes per hole)		
Splitspoon sampling (Expansion Tests)	20	Samples
Bulk Sampling (400 lbs samples)	3	Samples
Moisture Content Samples	3	Jars
Elevation Surveys	30	Person-Hours
(5 person hours per section per layer, ~60 points/section/layer)		
Shipping to FHWA Lab		
AC Cores	13	Cores
Bulk Dense Graded Aggregate sample	3	300 lbs samples
Subgrade Samples (Bulk)	3	300 lbs samples
Subgrade Samples (Shelby Tubes)	6	Tubes
Shipping to SHRP Materials Reference Library		
AC Bulk sample	3	5 gal pails (200 lbs)
Asphalt Cement sample	3	5 gal pails
Bulk AC Aggregate sample	1	500 lbs drum

Sampling and Testing of SPS-8 Test Sections

Material sampling and testing on this project during construction includes the following measurements, tests and samples from the various construction stages:

Subgrade

- Bulk sampling and thin-walled tube sampling of the prepared subgrade surface.
- Moisture content sampling of the prepared subgrade surface.
- Moisture and density tests on the prepared subgrade surface.
- Splitspoon sampling at 2 foot increments to a depth of 20 feet.
- Base line elevation surveys on the surface of the prepared subgrade or embankment to use as a reference in determining layer thickness.

Dense Graded Aggregate Base

- Bulk sampling of the uncompacted dense graded aggregate base (DGAB).
- Moisture content sampling of the prepared DGAB surface.
- Moisture and density tests on the prepared DGAB.
- Elevation measurements on the prepared DGAB surface.

Asphalt Concrete Surface

- Bulk sampling of the Asphalt Concrete (AC) materials (mixture, cement and aggregate).
- Coring of the AC for laboratory testing.
- Density tests on compacted AC.
- Elevation measurements on the prepared AC surface.

The details for these samples, tests, and measurements are presented in subsequent portions of this document organized by layer type.

The development of the materials sampling plan was based upon an assumed continuous construction sequencing. Significant time delays between the construction of the test sections may require changes to this sampling plan.

Referenced Documents

In addition to the appropriate AASHTO and ASTM standard methods and test referenced in this document, the following SHRP-LTPP documents serve as reference material which contain greater details on the sampling and testing requirements and data forms.

SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing (AC, Bituminous Materials, Aggregates and Soils), Operational Guide No. SHRP-LTPP-OG-004, Strategic Highway Research Program, November, 1989, (Revised January, 1992).

Specific Pavement Studies, Materials and Testing Requirements for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads, Operational Memorandum No. SHRP-LTPP-OM-030, Strategic Highway Research Program, August 1992.

SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling, Version 2.0, Operational Guide No. SHRP-LTPP-OG-006, Strategic Highway Research Program, May 1990.

Data forms and instructions for all field sampling and measurements described in this document are contained in "**Specific Pavement Studies, Material Sampling and Testing Requirements for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads**" for the AC surface test sections. These data forms must be completed at the time of the work. Completed forms shall be submitted to the designated LTPP representative.

Test Section Layout

Figure 1 illustrates the ordering and combination of experimental test section pavement structures to be constructed. Construction stations are shown in this figure. Stylized transitions in the pavement structure are shown between the test sections. Transition details will depend upon construction sequence and practice.

The stationing for the location of the test sections are shown in Tables 3 and 4. In Table 3 the location of each section is specified in terms of the project's construction stationing. The relevant design features of each test section are also shown in this table.

In Table 4, the location of each test section is specified in terms of the construction stationing, test section stationing, and LTPP reference project stations. Construction stations are the same as those shown on the construction plans. Test section stationing refers to the method LTPP uses to reference locations within and adjacent to the ends of individual test sections. The LTPP test section stations start with station 0+00 assigned to the beginning of the 500 foot monitoring portion of the test section, and station 5+00 at the end of the monitoring portion. The reference stationing system will be used by LTPP for future monitoring measurements.

In general, all sampling of compacted material should occur at the ends of the test section between the start of the test section and the start of the monitoring portion, or between the end of the monitoring portion and the end of the test section. The only samples and tests performed within the 500 feet monitoring portion are sampling of the subgrade material, elevation measurements and nuclear moisture-density tests.

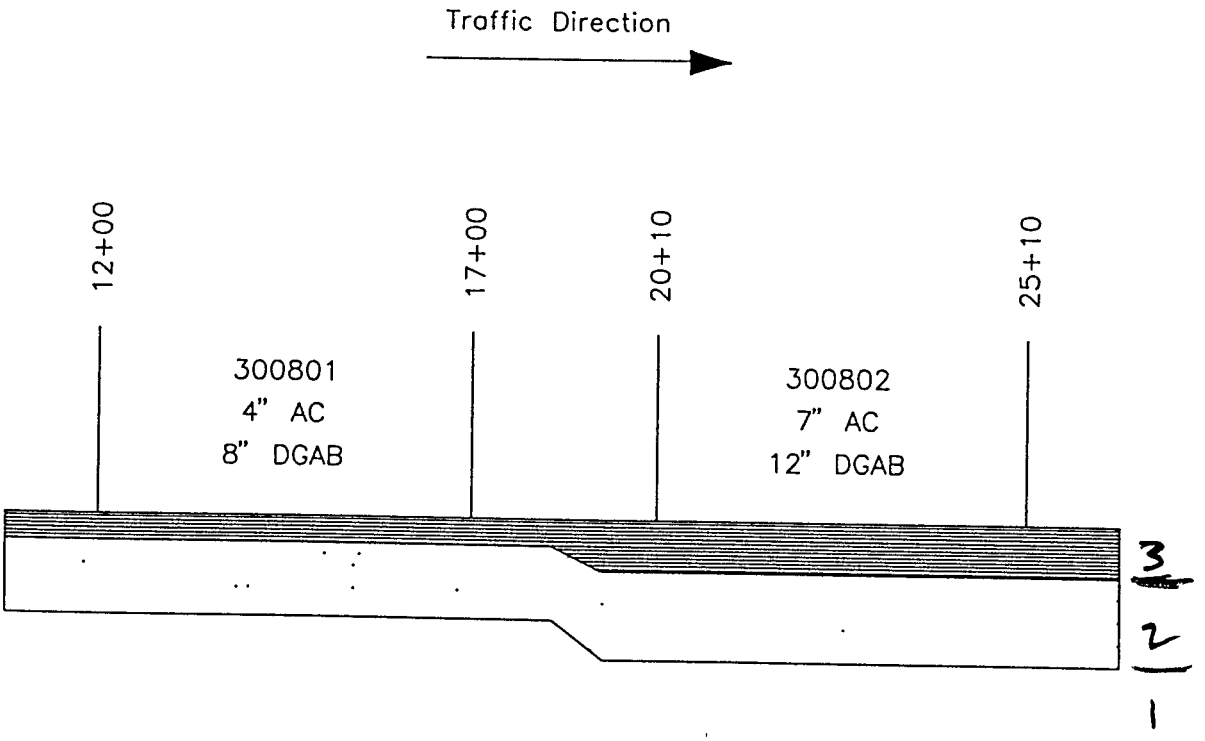


Figure 1. Layout of experimental test sections, Montana SPS-8 project, RS 273.

Table 3. Location of SPS-8 test sections, RS 273 Montana.

Section No.	Start Section	Start Monitor	End Monitor	End Section	Notes
300801	11+00	12+00	17+00	18+00	4"AC/8"DGAB
Trans	18+00			19+00	
300802	19+00	20+10	25+10	26+00	7"AC/12"DGAB

AC - Asphalt Concrete
DGAB - Dense Graded Aggregate Base

Table 4. Test section location table showing construction and project stations.

Test Section	Location	Construction Stationing	Test Section Stationing	SHRP Reference Project Station
300801	Begin	11+00	-1-00	
	Begin Monitoring	12+00	0+00	0+00
	End Monitoring	17+00	5+00	5+00
	End	18+00	6+00	6+00
300802	Begin	19+00	-1-10	7+00
	Begin Monitoring	20+10	0+00	8+10
	End Monitoring	25+10	5+00	13+10
	End	26+00	5+90	14+00

Overview of Sampling and Testing

An overview of the material sampling and testing to be performed on all test sections is shown in Figure 2 for each pavement layer. In this figure, symbols are used to designate the locations for the various types of samples and tests. Bulk samples of AC test sections should be obtained during construction.

Although all sampling is to be performed by the state, the laboratory materials testing will be performed by both the state and the FHWA-LTPP Testing Contractor Laboratory. There are additional samples which will be collected for the SHRP Materials Reference Library as well. When instructed to "ship to FHWA lab" or "MRL samples" the following guidelines should be followed:

Ship to FHWA Lab

The FHWA contracted testing laboratory is:

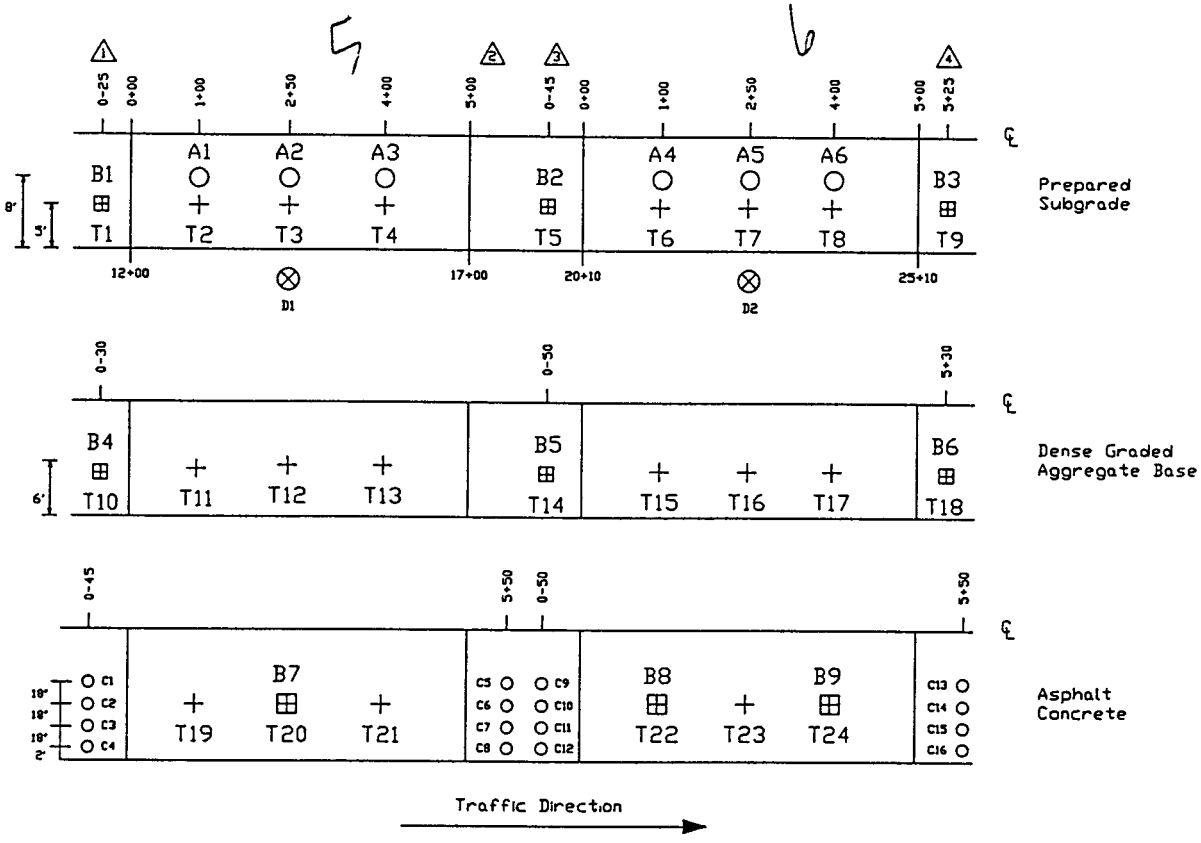
Braun Intertec Testing
Attention: Al Palmer
6801 Washington Ave. South
Minneapolis, Minnesota 55439
(612) 941-5600

Before shipping any material, Cal Berge (SHRP Regional Engineer, (702) 329-4955) and Al Palmer (Braun Intertec, (612) 941-5600) should be notified of the planned shipment. Cost of shipping is a state requirement.

MRL Samples

The SHRP Materials Reference Library (MRL) is located in Sparks, Nevada and is operated under contract with the FHWA by Nichols Consulting Engineers, Chtd. The MRL will supply containers and provide shipping of the samples to Sparks, Nevada. Coordination for the containers and shipping should be directed to:

Nichols Consulting Engineers, Chtd.
Attention: Andrew Brigg
1625 Crane Way
Sparks, Nevada 89431
(702) 358-7574 or
(702) 329-4955



D1-D2 - 20' Splitspoon sampling
A1-A6 - Thinwall tube samples of subgrade
T1-T9 - Moisture-density tests on subgrade (Nuclear)
B1-B3 - Bulk samples of subgrade
T10-T18 - Moisture-density tests on DGAB (Nuclear)
B4-B6 - Bulk samples of DGAB
T19-T24 - Density tests on AC (Nuclear)
B7-B9 - Bulk samples of AC mixture
C1-C16 - 4' cores of AC surface

Figure 2. Overview of sampling, testing and coring plan for **Asphalt Concrete** sections on SPS-8 Montana project.

Subgrade

The subgrade layer measurements, tests and sampling should be performed prior to placement of the base layers. The objective is to characterize the properties of the prepared subgrade surface or embankment fill material immediately prior to the time the base layers are placed. It is therefore desired that the moisture-density tests, thin-walled tube samples, bulk samples, and elevation measurements be performed just prior to the time when the base course is placed. This is important in instances when the prepared subgrade will be left exposed to the elements for a significant period, 2-3 months depending on climatic events, which influence the properties of the upper layers of the subgrade.

A summary of the samples, laboratory and field tests on the subgrade materials is presented in Table 5. In this table, B-type samples are bulk samples and A-type samples are thin-wall (Shelby) tube samples of the subgrade materials. The T-type test locations are for nuclear moisture-density tests, and the D-type locations are for the 20' deep splitspoon sampling through the shoulder.

Thin-wall (Shelby) Tube Samples

Undisturbed samples of the natural subgrade or fill material shall be obtained to a depth of 4 feet below the top of the prepared subgrade or fill using thin-wall (Shelby) tube sampling at the locations listed in Table 6. Two samples should be obtained at each location. These operations shall be performed in accordance with **AASHTO T203 "Soil Investigation and Sampling by Auger Boring"** and **AASHTO M146 "Terms Relating to subgrade, Soil-Aggregate and Fill Materials"**. Shelby tube sampling shall be performed in accordance with **AASHTO T207**.

Bulk Samples

Bulk samples of the subgrade or embankment material should be obtained from the locations listed in Table 7. In general, bulk sampling should consist of a single excavation, 2 feet by 2 feet in area and 12 inches deep. Approximately 400 lbs of material should be obtained from each sampling location. The sampling operation should be performed following similar procedures to those contained in Section 3.5 of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling as appropriate. Samples for gravimetric moisture tests should be obtained at each bulk sample location. **In-place density and moisture tests should be obtained at each bulk sampling location prior to sampling operations.**

Density and Moisture Measurements

In-place density and moisture measurements should be performed on the prepared subgrade or embankment material surface at the locations specified in Table 8. These test shall be performed using recently calibrated nuclear moisture-density gauges in accordance with the procedures in **AASHTO T238-86, Method B-Direct Transmission, AASHTO T239-86 and**

ASTM D2950-82. Each measurement shall be the result of the average of four reading made during each 90° rotation of the nuclear gauge through a full 360°.

Splitspoon Samples

Continuous splitspoon sampling shall be conducted to a depth of 20 feet using a truck mounted drill rig similar to that used for the shoulder auger boring (S-type sampling locations). For a given 20 feet sampling location, 10 samples, each representing 2 feet of material shall be retrieved. A 6-inch hollow-stem continuous flight auger with an inside diameter greater than 2.2 inches shall be used to obtain the splitspoon samples. Sampling shall be don'using only a 140 pound hammer, 30 inch drop and a sampler as specified in AASHTO T206, "Penetration Test and Split-barrel Sampling of Soils." Core retainers shall be used when necessary to retain soil. Care shall be exercised to provide a free fall of the hammer (minimum friction and straight pipe) and to minimize variations in drop height. It is essential that a clearly visible reference mark be identified on the splitspoon drop hammer rod so that the drop height is consistent. Blow counts and strata depths and field classifications shall be recorded on Sampling Data Sheet 4-2.

Table 5. Field and laboratory test plan for **Subgrade** materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Sieve Analysis	SS01	Ship to FHWA Lab	3	B1 - B3
Hydrometer to 0.01 mm	SS02	Ship to FHWA Lab	3	B1 - B3
Atterberg Limits	SS03	Ship to FHWA Lab	3	B1 - B3
Classification and Type of Subgrade	SS04	Ship to FHWA Lab	6	B1 - B3, A1, A3, A5
Classification and Type of Subgrade	SS04	P52[1]	3	A2, A4, A6
Moisture-Density Relations	SS05	Ship to FHWA Lab	3	B1 - B3
Resilient Modulus	SS07	Ship to FHWA Lab	3	A1, A3, A5 or B1 - B3
Unit Weight	SS08	P56	2	A4, A6
Natural Moisture Content	SS09	Ship to FHWA Lab	3	B1 - B3
Unconfined Compression Strength	SS10	P54	2	A2, A4
Permeability	SS11 or UG09	P57 or P48	1	A2 or B2
In-Place Density		SHRP-LTPP Method	9	B1-B3, T1-T6
Expansion Index	SS12	P60	20	D1, D2

Note 1. Visual-manual classification method ONLY.

Table 6. Locations for thin-wall (Shelby) tube sampling of **Subgrade**, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section
			Center Line, Rt	Outside Lane Edge, Lt	
A1	13+00	1+00	4	8	1
A2	14+50	2+50	4	8	1
A3	16+00	3+00	4	8	1
A4	21+10	1+00	4	8	2
A5	22+60	2+50	4	8	2
A6	24+10	3+00	4	8	2

Table 7. Locations for prepared **Subgrade** bulk sampling, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section	Sample Area
			Center Line, Rt	Outside Lane Edge, Lt		
B1	11+75	0-25	7	5	1	1
B2	19+65	0-45	7	5	2	3
B3	25+35	5+25	7	5	2	4

Table 8. Locations for in-place density and moisture tests on prepared **Subgrade**, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section
			Center Line, Rt	Outside Lane Edge, Lt	
T1	11+75	0-25	7	5	1
T2	13+00	1+00	7	5	1
T3	14+50	2+50	7	5	1
T4	16+00	3+00	7	5	1
T5	19+65	0-40	7	5	2
T6	21+10	1+00	7	5	2
T7	22+60	2+50	7	5	2
T8	24+10	3+00	7	5	2
T9	25+35	5+25	7	5	2

Table 9. Location of 20' deep splitspoon sampling, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section
			Center Line, Rt	Outside Lane Edge, Rt	
D1	14+50	2+50	18	6	1
D2	22+60	2+50	18	6	2

Dense Graded Aggregate Base

The measurements, tests and samples on the Dense Graded Aggregate Base (DGAB) layer should be performed prior to placement of the next layer. The objective is to characterize the properties of the prepared base at the time when the next pavement layer is placed. It is therefore desired that the moisture-density tests and elevation measurements be performed just prior to the time when the next pavement layer is placed. This is most important in instances when the aggregate base will be left exposed to the elements for a significant period, 2-3 months depending on climatic events, which might influence the properties of the material.

A summary of the samples to be taken from the DGAB material and tests to be conducted are presented in Table 10. Only bulk material jar moisture samples of the DGAB material are taken. Field tests include in-place density and moisture measurements.

Bulk Samples

Bulk samples of the DGAB material should be obtained at the approximate locations specified in Table 11. Sampling maybe performed prior to compaction to avoid interruptions to construction activities. Uncontaminated 400 pound samples shall be obtained from each location. Procedures similar to those contained in section 3.5 of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling should be followed. Jar moisture samples should be collected after final preparation of the DGAB surface.

Density and Moisture Measurements

Nuclear density and moisture measurements shall be performed on top of the prepared DGAB at the location specified in Table 12. These measurements shall be performed following the same procedures used for subgrade soils.

Table 10. Field and laboratory test plan for **Dense Graded Aggregate Base** materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Particle Size Analysis	UG01	Ship to FHWA lab[1]	3	B4 - B6
Sieve Analysis (washed)	UG02	Ship to FHWA lab[1]	3	B4 - B6
Atterberg Limits	UG04	Ship to FHWA lab[1]	3	B4 - B6
Moisture-Density Relations	UG05	Ship to FHWA lab[1]	3	B4 - B6
Resilient Modulus	UG07	Ship to FHWA lab[1]	3	B4 - B6
Classification	UG08	Ship to FHWA lab[1]	3	B4 - B6
Permeability	UG09	P48	3	B4 - B6
Natural Moisture Content	UG10	Ship to FHWA lab[1]	3	B4 - B6
In-Place Density		SHRP-LTPP Method	9	T10 - T18

Note 1: Ship to FHWA lab after splitting and quartering a 100 pound sample for the state testing.

Table 11. Bulk sampling of uncompacted **Dense Graded Aggregate Base**, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section	Sample Area
			Center Line, Rt	Outside Lane Edge, Lt		
B4	11+70	0-30	7	5	1	1
B5	19+60	0-50	7	5	2	3
B6	25+30	5+30	7	5	2	4

Table 12. Locations for in-place moisture and density measurements on compacted **Dense Graded Aggregate Base,** SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section
			Center Line, Rt	Outside Lane Edge, Lt	
T10	11+70	0-30	6	6	1
T11	13+00	1+00	6	6	1
T12	14+50	2+50	6	6	1
T13	16+00	3+00	6	6	1
T14	19+60	0-50	6	6	2
T15	21+10	1+00	6	6	2
T16	22+60	2+50	6	6	2
T17	24+10	3+00	6	6	2
T18	25+40	5+30	6	6	2

Asphalt Concrete Surface

The field and laboratory test plan for the Asphalt Concrete (AC) materials is presented in Table 13. Sampling of this material includes bulk samples of the asphalt, aggregate, and uncompacted mix and cores obtained after placement and compaction of the AC surface material. Nuclear density tests should also be performed on the compacted surface.

Bulk Samples

Bulk sampling of the uncompacted mix can be performed at the test site from a haul vehicle or near the paver. Care should be taken to obtain the designated samples of the materials to be placed in the test sections shown in Figure 2. These samples shall be obtained in accordance with **AASHTO T168** and shipped to the laboratory in suitable containers. If sampling at the test site is not feasible, then bulk sampling can be performed at the mix plant provided that the material sampled is the same material being placed in the designated test section. Three 200 pound samples of the mixture shall be collected.

Samples of the asphalt cement should consist of three 5 gallon pails obtained from the mix plant. Collect samples from the mix plant after asphalt has been heated for mixing. Three pails of each type of asphalt cement used on the project are needed.

In addition to the bulk samples described above for SPS testing purposes, the following bulk samples should be obtained for the SHRP Materials Reference Laboratory:

- 15 gallons of asphalt cement used in the asphalt concrete mix. Collect from the mix plant after asphalt has been heated for mixing. Three 5-gallon pails will be provided by SHRP for storage and shipping.

- 500 lbs of the finished aggregate product (combined coarse and fine aggregate) used in the asphalt concrete mix. This material shall be sampled in accordance with applicable portions of AASHTO Designation T2. For drum plants, the aggregate should be obtained from the charging (inclined) conveyor using the bypass chute, if possible. Otherwise the material should be taken from the belt on the charging conveyor. The aggregates should be sampled from the inclined conveyor at the dryer on batch plants. This material should be collected in one 55-gallon drum supplied by SHRP.

- 200 lbs of the finished asphalt concrete mix material used on the test sections. This material shall be sampled at the plant or from the site in accordance with applicable sections of AASHTO T168. SHRP will provide three 5-gallon containers for shipment and storage of this material.

Cores

Cores of the asphalt concrete shall have a 4" diameter. The core locations are listed in Table 14. The resilient modulus test, indirect tensile strength test, and creep compliance test will be performed by the FHWA-LTPP Testing Contractor Laboratory.

Care shall be taken to insure that all cores are obtained at a 90° angle to the pavement surface and that the edges are straight, intact, smooth and suitable for laboratory testing. Details on tolerance and quality control of coring operations are contained in Section 4 of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling.

Care shall be taken to package all cores for transport and shipping in suitable containers to prevent damage or degradation of the core during transport.

Density Measurements

Nuclear density measurements shall be performed on top of the prepared AC at the location specified in Table 16. These measurements shall be performed following **AASHTO T238-86, Backscatter Method**. As with the unbound materials, each testing location shall have four readings with the density instrument rotated 90° between each reading.

Table 13. Field and laboratory test plan for **Asphalt Concrete** surface materials, SPS-8 Montana.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Core Examination/Thickness	AC01	P01	3	C10 - C12
Bulk Specific Gravity	AC02	P02	3	C10 - C12
Maximum Specific Gravity	AC03	P03	3	B7 - B9 from paver
Asphalt Content (Extraction)	AC04	P04	3	B7 - B9 from paver
Moisture Susceptibility	AC05	P05	3	B7 - B9 from paver
Creep compliance	AC06	Ship to FHWA Lab	1	C9
Resilient Modulus	AC07	Ship to FHWA Lab	3	C1-C3, C5-C7, C13-C15
Indirect Tensile Strength	AC07	Ship to FHWA Lab	3	C4, C8, C16
In-Place Density		SHRP-LTPP Method	6	T19-T24
Asphalt Cement				
Abson Recovery	AE01	P21	3	B7 - B9 from paver
Penetration @ 50F, 77F, 90F	AE02	P22	3	B7 - B9 from paver
Specific Gravity @ 60F	AE03	P23	3	B7 - B9 from paver
Viscosity @ 77F	AE04	P24	3	B7 - B9 from paver
Viscosity @ 140F, 275F	AE05	P25	3	B7 - B9 from paver
Extracted Aggregate				
Specific Gravity of Coarse Aggregate	AG01	P11	3	B7 - B9 from paver
Specific Gravity of Fine Aggregate	AG02	P12	3	B7 - B9 from paver
Type and Class of Coarse Aggregate	AG03	P13	3	B7 - B9 from paver
Type and Class of Fine Aggregate	AG03	P13	3	B7 - B9 from paver
Aggregate Gradation	AG04	P14	3	B7 - B9 from paver
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	3	B7 - B9 from paver
NAA Test for Coarse Aggregate Particle Shape	AG06	P14B	3	B7 - B9 from paver
Asphalt Cement (From Plant)				
Penetration @ 50F, 77F, 90F	AE02	P22	3	B10 - B12 from plant
Specific Gravity @ 60F	AE03	P23	3	B10 - B12 from plant
Viscosity @ 77F	AE04	P24	3	B10 - B12 from plant
Viscosity @ 140F, 275F	AE05	P25	3	B10 - B12 from plant

Table 13. Field and laboratory test plan for **Asphalt Concrete** surface materials, SPS-8 Montana (Contd.).

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source/Test Locations
Asphalt Cement samples (three 5-gallon pails)	Storage	Ship to MRL[1]	15 gallons	Mix Plant
Aggregate samples (one 55-gallon drum)	Storage	Ship to MRL[1]	500 pounds	Mix Plant
Bulk asphalt concrete Mixture samples (three 5-gallon pails)	Storage	Ship to MRL[1]	200 pounds	Roadway

Note 1: Containers and shipping will be provided by FHWA.

Table 14. **Asphalt Concrete** core locations, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section	Sample Area
			Center Line, Rt	Outside Lane Edge, Lt		
C1	11+50	0-50	5.5	6.5	1	1
C2	11+50	0-50	7	5	1	1
C3	11+50	0-50	8.5	3.5	1	1
C4	11+50	0-50	10	2	1	1
C5	17+50	5+50	5.5	6.5	1	2
C6	17+50	5+50	7	5	1	2
C7	17+50	5+50	8.5	3.5	1	2
C8	17+50	5+50	10	2	1	2
C9	19+60	0-50	5.5	6.5	2	3
C10	19+60	0-50	7	5	2	3
C11	19+60	0-50	8.5	3.5	2	3
C12	19+60	0-50	10	2	2	3
C13	25+60	5+50	5.5	6.5	2	4
C14	25+60	5+50	7	5	2	4
C15	25+60	5+50	8.5	3.5	2	4
C16	25+60	5+50	10	2	2	4

Table 15. Locations for cores of the **Asphalt Concrete** surface material for the SHRP Materials Reference Library, SPS-8 Montana.

TABLE 15 IS NO LONGER VALID AND HAS BEEN DELETED

Table 16. Locations for in-place density measurements on compacted **Asphalt Concrete**.

Sample Location Designation	Construction Stationing	Test Section Stationing	Offset, feet		Test Section
			Center Line, Rt	Outside Lane Edge, Lt	
T19	13+00	1+00	6	6	1
T20	14+50	2+50	6	6	1
T21	16+00	3+00	6	6	1
T22	21+10	1+00	6	6	2
T23	22+60	2+50	6	6	2
T24	24+10	3+00	6	6	2

Elevation Measurements

Elevation measurements shall be made on the surface of each pavement layer (prepared subgrade or embankment, Dense Graded Aggregate Base, and AC surface) at the locations specified in Table 17. Measurements must be made to an accuracy of 0.01 feet. Care must be taken to re-establish the same points on the surface of each succeeding material layer to insure accurate determination of the thickness of each layer.

Table 17. Elevation surveys locations, SPS-8 Montana.

Sample Location Designation	Construction Stationing	Rt Offset, Center Line, feet					Lt Offset, Lane Edge, Feet					Test Section
		1	2	3	4	5	1	2	3	4	5	
E1	12+00	12	9	6	3	0	0	3	6	9	12	1
E2	12+50	12	9	6	3	0	0	3	6	9	12	1
E3	13+00	12	9	6	3	0	0	3	6	9	12	1
E4	13+50	12	9	6	3	0	0	3	6	9	12	1
E5	14+00	12	9	6	3	0	0	3	6	9	12	1
E6	14+50	12	9	6	3	0	0	3	6	9	12	1
E7	15+00	12	9	6	3	0	0	3	6	9	12	1
E8	15+50	12	9	6	3	0	0	3	6	9	12	1
E9	16+00	12	9	6	3	0	0	3	6	9	12	1
E10	16+50	12	9	6	3	0	0	3	6	9	12	1
E11	17+00	12	9	6	3	0	0	3	6	9	12	1
E12	20+10	12	9	6	3	0	0	3	6	9	12	2
E13	20+60	12	9	6	3	0	0	3	6	9	12	2
E14	21+10	12	9	6	3	0	0	3	6	9	12	2
E15	21+60	12	9	6	3	0	0	3	6	9	12	2
E16	22+10	12	9	6	3	0	0	3	6	9	12	2
E17	22+60	12	9	6	3	0	0	3	6	9	12	2
E18	23+10	12	9	6	3	0	0	3	6	9	12	2
E19	23+60	12	9	6	3	0	0	3	6	9	12	2
E20	24+10	12	9	6	3	0	0	3	6	9	12	2
E21	24+60	12	9	6	3	0	0	3	6	9	12	2
E22	25+10	12	9	6	3	0	0	3	6	9	12	2

Shipping Tracking Table

This section contains a shipping tracking table which contains instructions for disposition of samples retrieved from the field. Using these tracking tables (Tables 18 and 19), sampling personnel can determine where each sample is supposed to be shipped and tested.

The Laboratory Test Number shall be assigned as per the following:

a. Beginning of the Section (Station 0-): samples of each layer that are retrieved from areas in the approach end of the test section (stations preceding 0+00) shall be assigned Laboratory Test Number '1'.
b. End of the Section (Stations 5+): samples of each layer that are retrieved from areas in the leave end of the test section (stations after 5+00) shall be assigned Laboratory Test Number '2'.
c. Middle of the Section (Stations 0+00 to 5+00): samples of each layer that are retrieved from areas in the middle of the test section (from the paver) shall be assigned Laboratory Test Number '3'.

Laboratory Tracking of Samples

This section contains Laboratory Sample Tracking Tables which contain instructions for sample handling and tracking throughout the laboratory testing process. Tables 20 through 22 detail the sample handling and testing for the state agency laboratory and Tables 23 through 25 detail the sample handling and testing for the FHWA-LTPP Laboratory Materials Testing Contractor.

These tables provide the laboratories with the following information and directions:

- tracking of samples as they are taken for the field and tested in the laboratory,
- laboratory test sequences for each pavement material type,
- dedicated sample(s) for each test,
- designation of extra samples for future use,
- instructions for sample storage, and
- special instructions and other remarks.

The following is a description of the column headings used for the tracking table:

- *Layer Number* - is assigned beginning with layer number 1. Layer number 1 is always assigned for the subgrade and the last layer number is always the pavement surface layer.
- *Layer Description Code* - is used to describe the material layer. Valid codes for this project are:

  Original Surface Layer 03
  AC Layer Below Surface (Binder Coarse) . . 04
  Base Coarse 05

Subgrade 07
Embankment (Fill) 11

- *Layer Type* - is used to classify the type of layer. Valid codes for this project are:

  AC . . . . . for asphalt concrete layer,
  GB . for unbound (granular) base layer,
  GS for unbound (granular) subbase layer,
  SS . . . . . for subgrade layer.

- *Test Section Number* - is the number of the test section for which the sample pertains.
- *Sample Location Number* - is the location the sample was taken and should be shown on sample tags and labels.
- *Sample Number* - is the number identifying each individual sample and should shown on sample tags and labels.
- *Lab Test Number* - shall be assigned as per the following:
  a. Beginning of the Section (Station 0-): samples of each layer that are retrieved from areas in the approach end of the test section (stations preceding 0+00) shall be assigned Laboratory Test Number '1'.
  b. End of the Section (Stations 5+): samples of each layer that are retrieved from areas in the leave end of the test section (stations after 5+00) shall be assigned Laboratory Test Number '2'.
  c. Middle of the Section (Stations 0+00 to 5+00): samples of each layer that are retrieved from areas in the middle of the test section (from the paver) shall be assigned Laboratory Test Number '3'.
- *Required Laboratory Tests Per Layer* - order in which testing shall proceed.
- *Extra Sample* - is the sample to be saved as a backup for other tests? A "yes" in this column implies that this is a dedicated extra sample saved for future use. A "no" indicates that a sample can be discarded after use.
- *Sample Storage* - the following codes are used to specify the sample storage conditions for samples:
  a. environmentally protected and controlled storeroom at 5-21°C (40-70°F).
  b. environmentally protected and controlled storeroom at 5-38°C (40-100°F).
  c. Thin-walled tube samples of the subgrade that should be stored in a fully supported condition and at temperatures between 5°C (40°F) and 21°C (70°F) in an environmentally protected storeroom. They shall be stored on their ends and shall always be stored in a vertical position with respect to the longitudinal axis of the tube in the same orientation as that retrieved from the field.
- *Sample Disposal?* - indicates whether or not a sample can be disposed of after testing. Generally all samples, or portions of samples that are not tested are saved until further notice.

Tables 20 through 22 and Tables 23 through 25 should be completed (layer number), checked and modified as necessary to reflect the actual samples received and then submitted to

Nichols Consulting Engineers for approval before any testing commences by the state testing lab and the FHWA-LTPP testing lab, respectively.

Data Forms

Data forms and instructions for all field sampling and measurements described in this document are contained in "**Specific Pavement Studies, Materials Sampling and Testing Requirements for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads**". These data forms must be completed at the time of the work. Completed forms shall be submitted to the designated LTPP representative.

Table 18. Samples to be retained by the **State Laboratory** (or their designee).

Sample Location Number	Sample Number	Lab Test Number	Type of Sample
Asphalt Concrete			
C10	CA10	1	4 in. Core
C11	CA11	1	4 in Core
C12	CA12	1	4 in. Core
B7	BA01	3	200 lb bulk sample
B8	BA02	3	200 lb bulk sample
B9	BA03	3	200 lb bulk sample
B10	BC04	3	5 gal bulk sample asphalt cement
B11	BC05	3	5 gal bulk sample asphalt cement
B12	BC06	3	5 gal bulk sample asphalt cement
Unbound Granular Base			
B4	BG01	1	400 lb bulk sample[1]
B5	BG02	1	400 lb bulk sample[1]
B6	BG03	2	400 lb bulk sample[1]
Subgrade (Embankment ≥ 1.2 m [4 ft]) - If thin-wall tubes available			
B1	BS01	1	400 lb bulk sample[1]
B2	BS02	1	400 lb bulk sample[1]
B3	BS03	2	400 lb bulk sample[1]
A2	TS03	3	Thin-Wall Tube
A2	TS04	3	Thin-Wall Tube
A4	TS07	3	Thin-Wall Tube
A4	TS08	3	Thin-Wall Tube
A6	TS011	3	Thin-Wall Tube
A6	TS012	3	Thin-Wall Tube

Note 1: The bulk sample is to be shipped to the participating agency laboratory where it is to be split and quartered. A 300 lb portion of the bulk sample is then to be shipped to the FHWA-LTPP Testing Contractor Laboratory for further testing.

Table 19. Samples to be Shipped to the **FHWA-LTPP Testing Contractor Laboratory.**

Sample Location Number	Sample Number	Lab Test Number	Type of Sample
Asphalt Concrete			
C1	CA01	1	4 in. Core
C2	CA02	1	4 in. Core
C3	CA03	1	4 in. Core
C4	CA04	1	4 in. Core
C5	CA05	1	4 in. Core
C6	CA06	1	4 in. Core
C7	CA07	1	4 in. Core
C8	CA08	1	4 in. Core
C9	CA09	1	4 in. Core
C13	CA13	2	4 in. Core
C14	CA14	2	4 in. Core
C15	CA15	2	4 in. Core
C16	CA16	2	4 in. Core
Unbound Granular Base			
B4	BG01	1	300 lb Bulk Sample[1]
B5	BG02	1	300 lb Bulk Sample[1]
B6	BG03	2	300 lb Bulk Sample[1]
B4	MG01	1	Moisture Content Jar Sample
B5	MG02	1	Moisture Content Jar Sample
B6	MG03	2	Moisture Content Jar Sample
Subgrade			
B1	BS01	1	300 lb Bulk Sample[1]
B2	BS02	1	300 lb Bulk Sample[1]
B3	BS03	2	300 lb Bulk Sample[1]
A1	TS01	3	Thin wall Tube Sample
A1	TS02	3	Thin wall Tube Sample
A3	TS05	3	Thin wall Tube Sample
A3	TS06	3	Thin wall Tube Sample
A5	TS09	3	Thin wall Tube Sample

Table 19. Samples to be Shipped to the **FHWA-LTPP Testing Contractor Laboratory** (continued).

Sample Location Number	Sample Number	Lab Test Number	Type of Sample
A5	TS10	3	Thin wall Tube Sample
B1	MS01	1	Moisture Content Jar Sample
B2	MS02	1	Moisture Content Jar Sample
B3	MS03	2	Moisture Content Jar Sample

Note 1: The bulk sample shall be obtained from the participating agency.

Table 20. Tracking Table of **Asphalt Concrete** Testing in the **State Laboratory**.

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence						
							Required Laboratory Tests Per Layer				Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth			
3	03	AC	02 4	C10/1	CA10	1	AC01/P01	AC02/P02			Yes	(a)	No
	03	AC	02 |	C11/2	CA11	1	AC01/P01	AC02/P02			Yes	(a)	No
	03	AC	02 |	C12/3	CA12	1	AC01/P01	AC02/P02			Yes	(a)	No
	03	AC	01 5	B7/.4	BA01	3	AC03/P03	AC04/P04	AC05/P05	Note 2	No	(a)	Yes
	03	AC	02 6	B8/.5	BA02	3	AC03/P03	AC04/P04	AC05/P05	Note 2	No	(a)	Yes
	03	AC	02 4	B9/.6	BA03	3	AC03/P03	AC04/P04	AC05/P05	Note 2	No	(a)	Yes
	03	AC	00	B10/.7	BC01	3	AE02/P22	AE03/P23	AE04/P24	AE05/P25	No	(a)	Yes
	03	AC	00	B11/.8	BC02	3	AE02/P22	AE03/P23	AE04/P24	AE05/P25	No	(a)	Yes
	03	AC	00	B12/.9	BC03	3	AE02/P22	AE03/P23	AE04/P24	AE05/P25	No	(a)	Yes

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.

2: Run tests AE01/P21 - AE05/P25 on recovered asphalt cement and tests AG01/P11 - AG05/P14A on extracted aggregate.

Table 21. Tracking Table of **Unbound Granular Base** Testing in the **State Laboratory.**

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence						
							Required Laboratory Tests Per Layer				Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth			
2	05	GB	01 5	B47 1	BG01	1	UG09/P48				No	(b)	Yes
	05	GB	02 6	B57.2	BG02	1	UG09/P48				No	(b)	Yes
	05	GB	02 6	B62.3	BG03	2	UG09/P48				No	(b)	Yes

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.

Table 22. Tracking Table of **Subgrade** Testing in the **State Laboratory**.

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence						
							Required Laboratory Tests Per Layer				Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth			
1	07	SS	01 S	B1 2.0	BS01	1	No Testing - Samples stored				Yes	(b)	No
	07	SS	02 6	B2 2.5	BS02	1	SS11/P57 - If TS03 or TS04 unavailable				Yes	(b)	No
	07	SS	02 6	B3 2.6	BS03	2	No Testing - Samples Stored				Yes	(b)	No
	07	SS	01 S	A2 2.7	TS03	3	SS04/P52 ✓	SS11/P57 ✓			No	(c)	Yes
	07	SS	01 S	A2 2.8	TS04	3					Yes	(c)	No
	07	SS	02 6	A4 2.9	TS07	3	SS04/P52 ✓	SS08/P56 ✓	SS10/P54 ✓		No	(c)	Yes
	07	SS	02 6	A4 3.0	TS08	3					Yes	(c)	No
	07	SS	02 6	A6 3.2	TS11	3	SS04/P52 ✓	SS08/P56 ✓	SS10/P54 ✓		No	(c)	Yes
	07	SS	02 6	A6 3.3	TS12	3					Yes	(c)	No
	07	SS	01 S	D1 3.4	JS01	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 3.5	JS02	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 3.6	JS03	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 3.7	JS04 ✓	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 3.8	JS05	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 3.9	JS06	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 4.1	JS07	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 4.2	JS08	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 4.3	JS09	3	SS12/P60				No	(b)	Yes
	07	SS	01	D1 4.4	JS10	3	SS12/P60				No	(b)	Yes

Table 22. Tracking Table of **Subgrade** Testing in the **State Laboratory** (continued). Revised April 1994

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence						
							Required Laboratory Tests Per Layer				Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth			
	07	SS	02	D2 4.5	JS11	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 4.6	JS12	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 4.7	JS13	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 4.8	JS14	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 4.9	JS15	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 5.1	JS16	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 5.2	JS17	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 5.3	JS18	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 5.4	JS19	3	SS12/P60				No	(b)	Yes
	07	SS	02	D2 5.5	JS20	3	SS12/P60				No	(b)	Yes

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.

Table 23. Tracking Table of **Asphaltic Concrete** Testing in the **FHWA-LTPP Testing Contractor Laboratory.**

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence						
							Required Laboratory Tests Per Layer				Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth			
	03	AC	01	2-17-3 C1	CA01	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-17-4 C2	CA02	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-17-5 C3	CA03	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-17-6 C4	CA04	1	AC01/P01	AC02/P02	AC07/P07 (ITS)		No	(a)	Yes
	03	AC	01	2-17-7 C5	CA05	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-17-8 C6	CA06	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-17-9 C7	CA07	1	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	01	2-18-1 C8	CA08	1	AC01/P01	AC02/P02	AC07/P07 (ITS)		No	(a)	Yes
	03	AC	02	2-18-2 C9	CA09	1	AC01/P01	AC02/P02	AC06/P06		No	(a)	Yes
	03	AC	02	2-18-3 C13	CA13	2	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	02	2-18-4 C14	CA14	2	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	02	2-18-5 C15	CA15	2	AC01/P01	AC02/P02	AC07/P07	AC07/P07 (ITS)	No	(a)	Yes
	03	AC	02	2-18-6 C16	CA16	2	AC01/P01	AC02/P02	AC07/P07 (ITS)		No	(a)	Yes

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.

Table 24. Tracking Table of **Unbound Granular Base** Testing in the **FHWA-LTPP Testing Contractor Laboratory.**

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence								
							Required Laboratory Tests Per Layer						Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth	Fifth	Sixth			
2	05	GB	01	218-1 B4	BG01	1	UG01/P41	UG02/P41	UG04/P43	UG08/P47	UG05/P44	UG07/P46	No	(b)	Yes
	05	GB	02	218-2 B5	BG02	1	UG01/P41	UG02/P41	UG04/P43	UG08/P47	UG05/P44	UG07/P46	No	(b)	Yes
	05	GB	02	218-3 B6	BG03	2	UG01/P41	UG02/P41	UG04/P43	UG08/P47	UG05/P44	UG07/P46	No	(b)	Yes
	05	GB	01	219-1 B4	MG01	1	UG10/P49						No	(b)	Yes
	05	GB	02	219-2 B5	MG02	1	UG10/P49						No	(b)	Yes
	05	GB	02	219-3 B6	MG03	2	UG10/P49						No	(b)	Yes

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.

Table 25. Tracking Table of **Subgrade** Testing in the **FHWA-LTPP Testing Contractor Laboratory.**

Layer Number (Note 1)	Layer Description Code	Layer Type	Test Section Number	Sample Location Number	Sample Number	Lab Test Number	Steps Involved in Laboratory Handling and Testing Sequence								
							Required Laboratory Tests Per Layer						Extra Sample	Sample Storage	Sample Disposed?
							First	Second	Third	Fourth	Fifth	Sixth			
	07	SS	01	219.4 B1	BS01	1	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46[2]	No	(b)	Yes
	07	SS	02	219.5 B2	BS02	1	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46[2]	No	(b)	Yes
	07	SS	03	219.6 B3	BS03	2	SS01/P51	SS02/P42	SS03/P43	SS04/P52	SS05/P55	SS07/P46[2]	No	(b)	Yes
	07	SS	01	219.7 B1	MS01	1	SS09/P49						No	(b)	Yes
	07	SS	02	219.8 B2	MS02	1	SS09/P49						No	(b)	Yes
	07	SS	03	219.9 B3	MS03	2	SS09/P49						No	(b)	Yes
	07	SS	01	220.1 A1	TS01	3	SS04/P52	SS07/P46					No	(c)	Yes
	07	SS	01	220.2 A1	TS02	3							Yes	(c)	No
	07	SS	01	220.3 A3	TS05	3	SS04/P52	SS07/P46					No	(c)	Yes
	07	SS	01	220.4 A3	TS06	3							Yes	(c)	No
	07	SS	02	220.5 A5	TS09	3	SS04/P52	SS07/P46					No	(c)	Yes
	07	SS	02	220.6 A5	TS10	3							Yes	(c)	No

Note 1: Layer Number to be completed by testing lab after reviewing field sampling logs.
2: SS07/P46 only performed if Tube samples are unavailable.